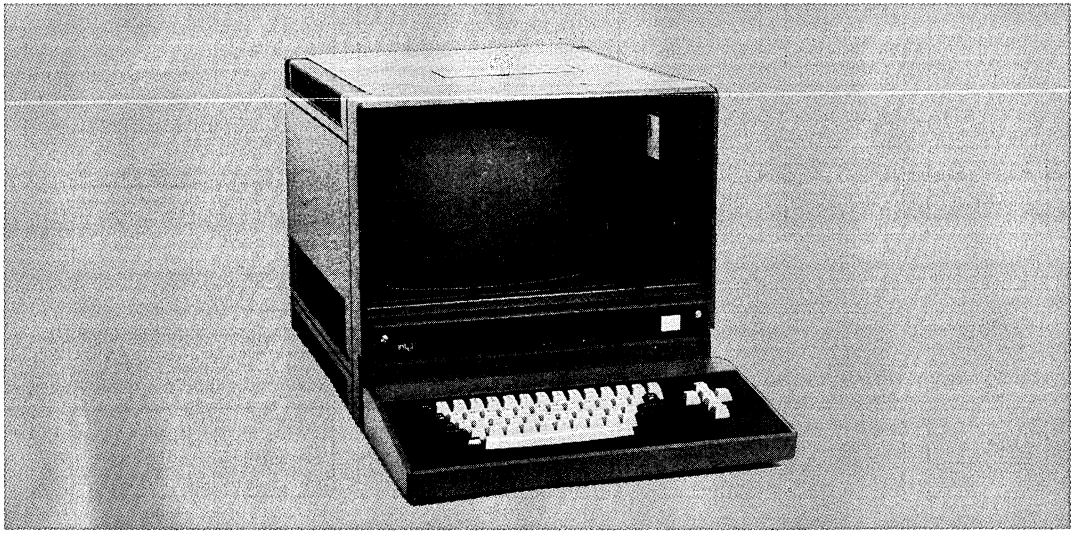
MODEL 225
INTELLEC® SERIES II/85
MICROCOMPUTER DEVELOPMENT SYSTEM

- **Complete microcomputer development system for MCS®-86, MCS®-85, MCS®-80, MCS®-48, and MCS®-51 microprocessor families**
- **High performance 8085A-2 CPU, 64K bytes RAM memory, and 4K bytes ROM memory**
- **Self-test diagnostic capability**
- **Built-in interfaces for high speed paper tape reader/punch, printer, and universal PROM programmer**
- **Integral 250K byte floppy disk drive with total storage capacity expandable to over 2M bytes of floppy disk storage and 7.3M bytes of hard disk storage**
- **Powerful ISIS-II Disk Operating System with relocating macroassembler, linker, locater, and CRT based editor CREDIT**
- **Supports PL/M, FORTRAN, BASIC, PASCAL and COBOL high level languages**
- **Software compatible with previous Intellec® systems**

The Intellec Series II/85 Model 225 Microcomputer Development System is a performance enhanced, complete microcomputer development system integrated into one compact package. The Model 225 includes a CPU with 64K bytes of RAM, 4K bytes of ROM, a 2000-character CRT, detachable full ASCII keyboard with cursor controls and upper/lower case capability, and a 250K-byte floppy disk drive. Powerful ISIS-II Disk Operating System software allows the Model 225 to be used quickly and efficiently for assembling and debugging programs for Intel's MCS-86, MCS-85, MCS-80, MCS-48, or MCS-51 microprocessor families. ISIS-II performs all file handling operations for the user, leaving him free to concentrate on the details of his own application. When used with an optional in-circuit emulator (ICE™) module, the Model 225 provides all of the hardware and software development tools necessary for the rapid development of a microcomputer-based product. Optional storage peripherals provide over 2 million bytes of floppy disk, and 7.3 million of hard disk storage capacity.



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FUNCTIONAL DESCRIPTION

Hardware Components

The Intellec Series II/85 Model 225 is a highly-integrated microcomputer development system consisting of a CRT chassis with a 6-slot cardcage, power supply, fans, cables, single floppy disk drive, and two printed circuit cards. A separate, full ASCII keyboard is connected with a cable. A block diagram of the Model 225 is shown in Figure 1.

CPU Cards — The master CPU card contains its own microprocessor, memory, I/O, interrupt and bus interface circuitry implemented with Intel's high technology LSI components. Known as the integrated processor card (IPC), it occupies the first slot in the cardcage. A second slave CPU card is responsible for all remaining I/O control including the CRT and keyboard interface. This card, mounted on the rear panel, also contains its own microprocessor, RAM and ROM memory, and I/O interface logic, thus, in effect, creating a dual processor environment. Known as the I/O controller (IOC), the slave CPU card communicates with the IPC over an 8-bit bidirectional data bus.

Expansion — Five remaining slots in the cardcage are available for system expansion. Additional expansion of 4 slots can be achieved through the addition of an Intellec Series II expansion chassis.

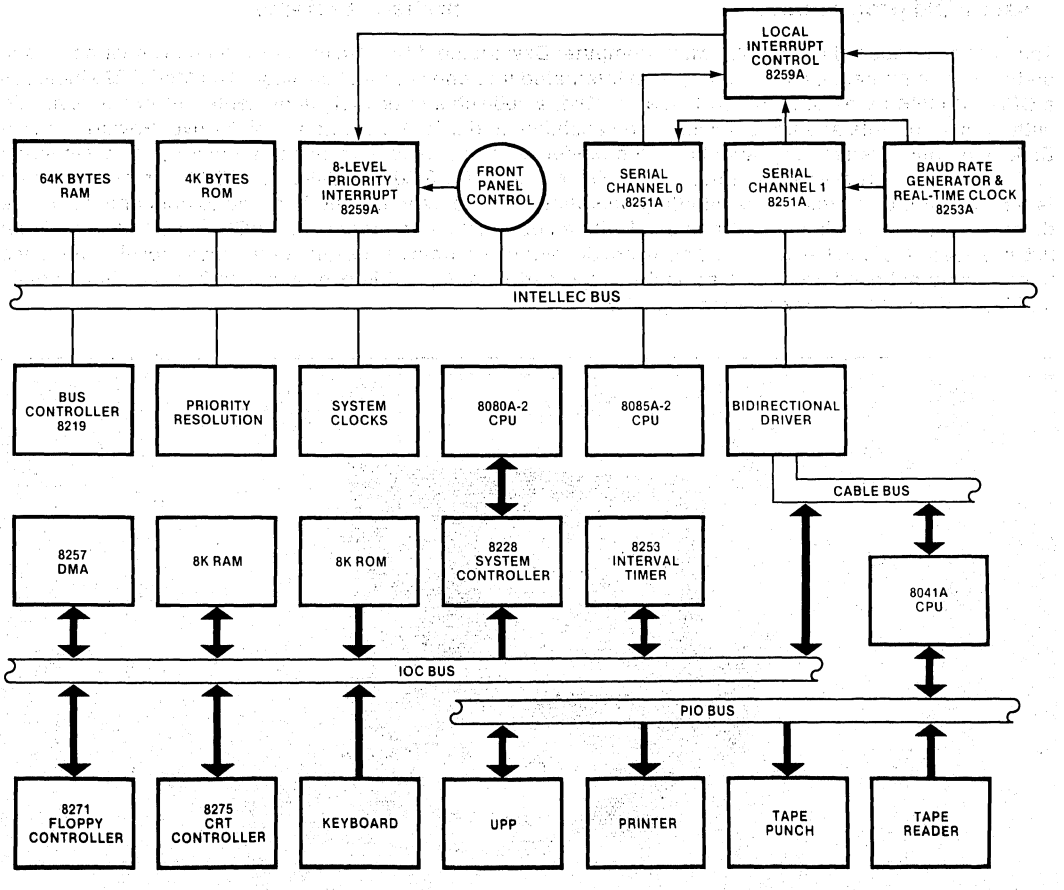

Figure 1. Intellec Series II/85 Model 225 Microcomputer Development System Block Diagram

System Components

The heart of the IPC is an Intel NMOS 8-bit microprocessor, the 8085A-2, running at 4.0 MHz. 64K bytes of RAM memory are provided on the board using 16K RAMs. 4K of ROM is provided, preprogrammed with system bootstrap "self-test" diagnostics and the Intellec Series II/85 System Monitor. The eight-level vectored priority interrupt system allows interrupts to be individually masked. Using Intel's versatile 8259A interrupt controller, the interrupt system may be user programmed to respond to individual needs.

Input/Output

IPC Serial Channels — The I/O subsystem in the Model 225 consists of two parts: the IOC card and two serial channels on the IPC itself. Each serial channel is RS232 compatible and is capable of running asynchronously from 110 to 9600 baud or synchronously from 150 to 56K baud. Both may be connected to a user defined data set or terminal. One channel contains current loop adapters. Both channels are implemented using Intel's 8251A USART. They can be programmed to perform a variety of I/O functions. Baud rate selection is accomplished through an Intel 8253 interval timer. The 8253 also serves as a real-time clock for the entire system. I/O activity through both serial channels is signaled to the system through a second 8259A interrupt controller, operating in a polled mode nested to the primary 8259A.

IOC Interface — The remainder of system I/O activity takes place in the IOC. The IOC provides interface for the CRT, keyboard, and standard Intellec peripherals including printer, high speed paper tape reader/punch, and universal PROM programmer. The IOC contains its own independent microprocessor, an 8080A-2. The CPU controls all I/O operations as well as supervising communications with the IPC. 8K bytes of ROM contain all I/O control firmware. 8K bytes of RAM are used for CRT screen refresh storage. These do not occupy space in Intellec Series II main memory since the IOC is a totally independent microcomputer subsystem.

Integral CRT

Display — The CRT is a 12-inch raster scan type monitor with a 50/60 Hz vertical scan rate and 15.5kHz horizontal scan rate. Controls are provided for brightness and contrast adjustments. The interface to the CRT is provided through an Intel 8275 single-chip programmable CRT controller. The master processor on the IPC transfers a character for display to the IOC, where it is stored in RAM. The CRT controller reads a line at a time into its line buffer through an Intel 8257 DMA controller and then feeds one character at a time to the character generator to produce the video signal. Timing for the CRT control is provided by an Intel 8253 interval timer. The screen display is formatted as 25 rows of 80 characters. The full set of ASCII characters is displayed, including lower case alphas.

Keyboard — The keyboard interfaces directly to the IOC processor via an 8-bit data bus. The keyboard contains an Intel UPI-41™ Universal Peripheral Interface, which scans the keyboard, encodes the characters, and buffers the characters to provide N-key rollover. The keyboard itself is a high quality typewriter style keyboard containing the full ASCII character set. An upper/lower case switch allows the system to be used for document preparation. Cursor control keys are also provided.

Peripheral Interface

A UPI-41 Universal Peripheral Interface on the IOC board provides interface for other standard Intellec peripherals including a printer, high speed paper tape reader, high speed paper tape punch, and universal PROM programmer. Communication between the IPC and IOC is maintained over a separate 8-bit bidirectional data bus. Connectors for the four devices named above, as well as the two serial channels, are mounted directly on the IOC itself.

Control

User control is maintained through a front panel, consisting of a power switch and indicator, reset/boot switch, run/halt light, and eight interrupt switches and indicators. The front panel circuit board is attached directly to the IPC, allowing the eight interrupt switches to connect to the primary 8259A, as well as to the Intellec Series II bus.

Integral Floppy Disk Drive

The integral floppy disk is controlled by an Intel 8271 single chip, programmable floppy disk controller. It transfers data via an Intel 8257 DMA controller between an IOC RAM buffer and the diskette. The 8271 handles reading and writing of data, formatting diskettes, and reading status, all upon appropriate commands from the IOC microprocessor.

MULTIBUS™ Interface Capability

All Intellec Series II/85 models implement the industry standard MULTIBUS protocol. The MULTIBUS protocol enables several bus masters, such as CPU and DMA devices, to share the bus and memory by operating at different priority levels. Resolution of bus exchanges is synchronized by a bus clock signal derived independently from processor clocks. Read/write transfers may take place at rates up to 5 MHz. The bus structure is suitable for use with any Intel microcomputer family.

SPECIFICATIONS

Host Processor (IPC)

8085A-2 based, operating at 4.0 MHz.
RAM — 64K on the CPU card
ROM — 4K (2K in monitor, 2K in boot/diagnostic)
Bus — MULTIBUS™ bus, maximum transfer rate of 5 MHz
Clocks — Host processor, crystal controlled at 4.0 MHz, bus clock, crystal controlled at 9.8304 MHz

I/O Interfaces

Two Serial I/O Channels, RS232C, at 110-9600 baud (asynchronous) or 150-56K baud (synchronous). Baud rates and serial format fully programmable using Intel 8251A USARTs. Serial Channel 1 additionally provided with 20 mA current loop. Parallel I/O interfaces provided for paper tape punch, paper tape reader, printer, and UPP-103 Universal PROM Programmer.

Interrupts

8-level, maskable, nested priority interrupt network initiated from front panel or user selected devices.

Direct Memory Access (DMA)

Standard capability on MULTIBUS interface; implemented for user selected DMA devices through optional DMA module—maximum transfer rate of 5 MHz.

Memory Access Time

RAM — 470 ns max
PROM — 540 ns max

Integral Floppy Disk Drive

Floppy Disk System Capacity —
250K bytes (formatted)
Floppy Disk System Transfer Rate —
160K bits/sec
Floppy Disk System Access Time —
Track to Track: 10 ms max
Average Random Positioning: 260 ms
Rotational Speed: 360 rpm
Average Rotational Latency: 83 ms
Recording Mode: FM

Physical Characteristics

CHASSIS

Width — 17.37 in. (44.12 cm)
Height — 15.81 in. (40.16 cm)
Depth — 19.13 in. (48.59 cm)
Weight — 73 lb. (33 kg)

KEYBOARD

Width — 17.37 in. (44.12 cm)
Height — 3.0 in. (7.62 cm)
Depth — 9.0 in. (22.86 cm)
Weight — 6 lb. (3 kg)

Electrical Characteristics

DC POWER SUPPLY

Volts Supplied	Amps Supplied	Typical System Requirements
+ 5 ± 5%	30.0	17.0
+12 ± 5%	2.5	1.1
−12 ± 5%	0.3	0.1
−10 ± 5%	1.0	0.08
+15 ± 5%*	1.5	1.5
+24 ± 5%*	1.7	1.7

*Not available on bus.

AC REQUIREMENTS FOR MAINFRAME

110V, 60 Hz — 5.9 Amp
220V, 50 Hz — 3.0 Amp

Environmental Characteristics

Operating Temperature — 16°C to 32°C (61°F to 90°F)
Humidity — 20% to 80%

Equipment Supplied

Model 225 Chassis including:
- Integrated Processor Card (IPC)
- I/O Controller Board (IOC)
- CRT
- ROM-Resident System Monitor

Detachable keyboard
ISIS-II System Diskette with MCS-80/MCS-85 Macroassembler
ISIS-II CREDIT Diskette CRT-Based Text Editor

Documentation Supplied

A Guide to Microcomputer Development Systems, 9800558

Intellec® Series II Model 22X/23X Installation Manual, 9800559

ISIS-II System User's Guide, 9800306

Intellec® Series II Hardware Reference Manual, 9800556

8080/8085 Assembly Language Programming Manual, 9800301

ISIS-II 8080/8085 Assembler Operator's Manual, 9800292

Intellec® Series II Systems Monitor Source Listing, 9800605

Intellec® Series II Schematic Drawings, 9800554

ISIS-II CREDIT (CRT-Based Text Editor) User's Guide, 9800902

Additional manuals may be ordered from any Intel sales representative or distributor office, or from Intel Literature Department, 3065 Bowers Avenue, Santa Clara, California 95051.

ORDERING INFORMATION

Part Number	Description
MDS-225*	Intellec® Series II/85 Model 225 Microcomputer Development System (110V/60 Hz)
MDS-226*	Intellec® Series II/85 Model 226 Microcomputer Development System (220V/50 Hz)

*"***MDS***"* is an ordering code only, and is not used as a product name or trademark. MDS® is a registered trademark of Mohawk Data Sciences Corp.